



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
04.07.2012 Bulletin 2012/27

(51) Int Cl.:
A43B 5/04 (2006.01) A43C 11/16 (2006.01)

(21) Application number: **11195968.0**

(22) Date of filing: **28.12.2011**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
 Designated Extension States:
BA ME

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(30) Priority: **28.12.2010 IT TV20100169**

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(54) **Ski boot**

(57) Ski boot (1) comprising a rigid shell (2) and a rigid cuff (5) hinged to the shell (2) about a first transversal reference axis (A) coincident with the articulation axis of the ankle of the user. A cuff locking device (9) is structured to rigidly fix the cuff (5) to the shell (2) or to release the cuff (5) from the shell (2) so as to allow the cuff (5) to pivot freely about said first reference axis (A); the cuff (5) comprising of a rigid front greave (12) and a rigid rear

greave (13) adapted to mutually couple one another so as to form a rigid and detachable tubular body (5); the rigid rear greave (13) being hinged to the shell (2) and being mechanically constrained to the shell (2) by means of the cuff locking device (9); the rigid front greave (12) being instead hinged to the rigid rear greave (13) about a second reference axis (A,C) to be able to tilt forward in an independent manner from the rigid rear greave (13).

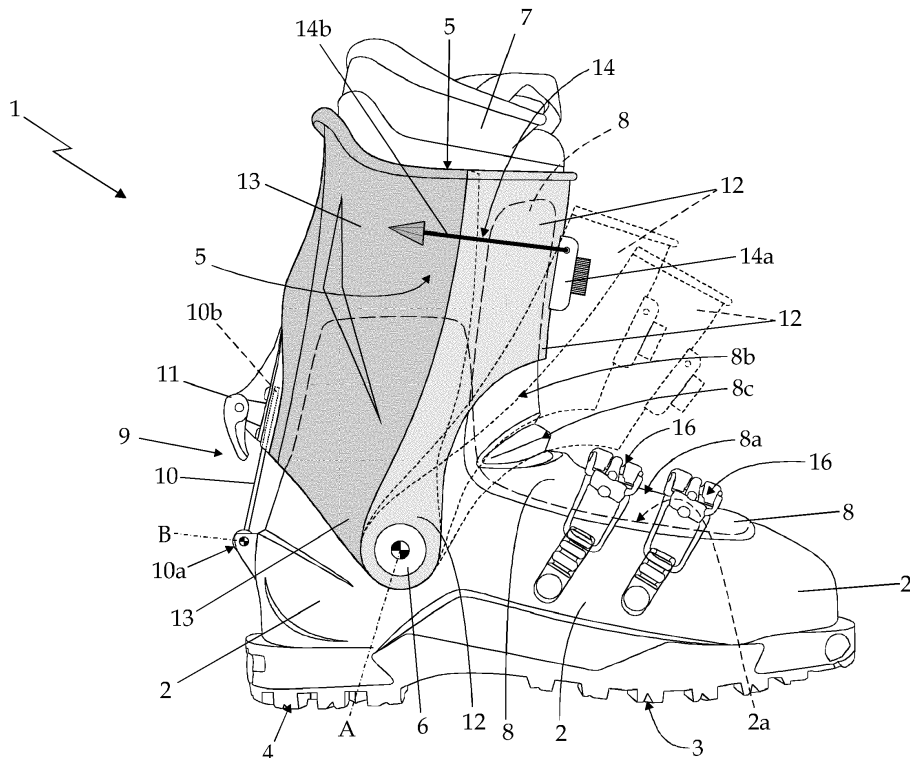


Fig. 1

Description

[0001] The present invention relates to a ski boot.

[0002] More in detail, the present invention relates to an alpine or Telemark ski boot, use to which the following description refers purely by way of example without this implying any loss of generality.

[0003] As known, more recent alpine or Telemark ski boots normally consist of a rigid shell made of plastic material which is shaped so as to receive the foot of the skier, and is bottomly provided with a front sole and with a rear heel usually made of a non-slip elastomeric material; of a rigid cuff made of plastic material which is C-shaped so as to surround the ankle of the skier from behind, and is hinged to the upper part of the shell so as to be able to rotate about a transversal reference axis substantially coincident with the articulation axis of the ankle; and of an inner liner made of soft, thermal-insulating material, which is removably inserted inside the shell and the cuff, and is shaped so as to surround and protect both the foot and the bottom part of the leg of the skier; and of a protective upper tongue made of plastic material, which has the bottom end hinged to the shell, immediately above the tarsal-phalangeal area of the foot, and extends along the upper part of the shell up to just underneath the cuff, so as to cover the longitudinal opening of the shell which allows the temporary widening of the shell to facilitate the insertion of the foot into the liner.

[0004] Alpine or Telemark ski boots are also provided with a number of manually-operated closing buckles which are conveniently distributed on the shell and on the cuff, and are structured so as to be able to selectively close/tighten the shell and the cuff so as to stably immobilize the leg of the skier within the boot; and of a manually-operated cuff locking device, which straddles the shell and the cuff, in the area immediately above the heel, and is structured so as to be able to adjust the pivoting ability of the cuff with respect to the shell.

[0005] In greater detail, the cuff locking device is structured so as to be able, on choice, to rigidly fix the cuff to the shell so as to prevent any relative movement between the two components; or to completely release the cuff from the shell so as to allow the cuff to freely pivot about the articulation axis of the ankle both forward and backward.

[0006] Considering that the rigidity of the protective tongue may be a hindrance to the movement of the cuff, almost all alpine and Telemark ski boots have, at the bend or elbow of the tongue, a transversal gusseted folding which extends from one lateral side to the other of the tongue, and is structured so as to allow, when needed, the protective tongue to elastically bend so as to go along with the pivoting of the cuff with respect to the shell, hence making the boot more flexible and comfortable during walking.

[0007] Unfortunately, the presence of transversal gusseted folding on the bend of the protective tongue creates problems when the cuff locking device have to rigidly fix

the cuff to the shell, so as to prevent any movement of the tibia with respect to the foot.

[0008] Indeed, even when the cuff locking device rigidly fixes the cuff to the shell, the tibia of the user may still tilt forward by some degrees without any hindrance due to the elastic bending of the upper part of the protective tongue, and to the two side strips of the cuff which saddle each other above the upper part of the protective tongue.

[0009] To obviate the excessive deformability of the front part of the cuff, certain manufacturers of alpine and Telemark ski boots have decided to provide their alpine and Telemark ski boots with a soft tongue and with a rigid tongue, which are easy to interchange with each other.

The transversal folding with programmed deformation is only on the soft tongue while the rigid tongue is generally provided with longitudinal stiffening ribs.

[0010] Although it resolves the problems of rigidity of the front part of the cuff, this solution is not very functional because it forces the skier/mountaineer to always carry two different types of protective tongues, and to replace the protective tongues when provided, regardless of the weather conditions at the time and with all the drawbacks this involves.

[0011] Aim of the present invention is to provide an alpine or Telemark ski boot which is simpler and more practical to use, and which is also capable of blocking the movement of the ankle of the user more efficiently, without however prejudicing the comfort of the fit.

[0012] In compliance with these aims, according to the present invention there is provided a ski boot as defined in claim 1 and preferably, though not necessarily, in any one of the dependent claims.

[0013] The present invention will now be described with reference to the accompanying drawings, which show a non-limiting embodiment thereof, in which:

- Figure 1 is the side view of an alpine ski boot made according to the dictates of the present invention;
- Figure 2 shows, on enlarged scale, and with sectional parts and parts removed for clarity, a detail of the alpine ski boot shown in figure 1; while
- Figure 3 is the side view of a second embodiment of the alpine ski boot shown in figure 1.

[0014] With reference to Figures 1 and 2, number 1 indicates as a whole a ski boot, and in particular a ski boot specifically structured for alpine or Telemark skiing.

[0015] Boot 1 basically consists of a rigid outer shell 2 made of plastic or composite material, which is shaped so as to receive the foot of the user, and is bottomly provided with a front sole 3 and a rear heel 4 preferably, though not necessarily, made of a non-slip elastomeric material; and of a rigid cuff 5 made of plastic or composite material, which is shaped so as to surround the bottom part of the leg of the user, and is hinged on the upper part of shell 2 so as to be able to freely tilt about a transversal reference axis A, which is substantially perpendicular

ular to the centreline plane of the boot (i.e. perpendicular to the plane of the sheet of paper in Figure 1), and is also locally substantially coincident with the articulation axis of the ankle of the user.

[0016] In greater detail, cuff 5 is freely pivotally fixed on shell 2 by means of two connecting hinges 6, which are positioned on the outer and inner lateral sides of shell 2 and of cuff 5, aligned along axis A so as to allow cuff 5 to tilt/rotate on shell 2 while always staying locally substantially coplanar to a reference plane orthogonal to axis A.

[0017] With reference to Figure 1, boot 1 is also provided with an inner liner 7 which is preferably made of soft and thermal insulating material, is preferably, though not necessarily, removably accommodated within shell 2 and cuff 5 and lastly, is shaped so as to surround and protect both the foot and the bottom part of the leg of the user; and of an oblong and convex protective tongue 8 which is preferably, though not necessarily, made of plastic or composite material, and is arranged resting on shell 2 in the area above the instep of the foot and the front part of the leg, to cover a longitudinal slit 2a which extends along the upper ridge of shell 2, i.e. above the instep of the foot and in front of the bottom part of the tibia, while remaining substantially coplanar to the longitudinal centreline plane of the boot. The longitudinal slit 2a allows the upper part of shell 2 to elastically widen so as to allow the user to slip his/her foot into liner 7 more easily.

[0018] In greater detail, with reference to Figures 1 and 2, the protective tongue 8 essentially consists of an oblong and convex rigid shell 8, which is substantially L-bent so as to copy the profile of the upper part of shell 2.

[0019] The bottom portion 8a of protective tongue 8 extends above shell 2, to completely cover the initial stretch of the longitudinal slit 2a which extends above the instep of the foot, approximately starting from the metatarsal area of the foot; while the upper portion 8b of the protective tongue 8 extends above shell 2 and underneath cuff 5, to completely cover the final stretch of the longitudinal slit 2a which is arranged substantially in front of the ankle and of the bottom part of the tibia of the user.

[0020] The bottom portion 8a and the upper portion 8b of protective tongue 8 are also structured so to be substantially rigid and indeformable, and the protective tongue 8 is also provided with an intermediate, elastically-deformable portion 8c which is more or less positioned at the bend of the tongue, so as to join the bottom portion 8a and the upper portion 8b of the tongue to each other, and is structured so as to allow the protective tongue 8 to elastically bend at the middle elbow thereof.

[0021] More in detail, the intermediate elastically-deformable portion 8c of the tongue is preferably, though not necessarily, positioned immediately below the point in which the tongue 8 slips underneath the cuff 5, i.e. more or less at the height where the tibia joins the talus bone of the foot.

[0022] In the example shown, in particular, the inter-

mediate portion 8c of the tongue preferably, though not necessarily, consists of gusseted folding 8c with programmed deforming, which extends from one side to the other of the protective tongue 8, more or less at the bend or elbow of the tongue (i.e. at the height where the tibia joins the talus bone of the foot), and is structured so as to allow the upper portion 8b of the tongue to freely tilt forward towards the bottom portion 8a of the tongue which rests on the area of shell 2 above the instep of the foot, thus going along with any tilting of cuff 5 with respect to shell 2.

[0023] Instead, the bottom portion 8a of protective tongue 8 is preferably, though not necessarily, hinged directly on shell 2 behind the tip of the latter (i.e. approximately above the tarso-phalangeal joint area of the foot), so that the entire protective tongue 8 may freely rotate about a reference axis locally substantially perpendicular to the longitudinal centreline plane of the boot, i.e. locally substantially parallel to tilting axis A of cuff 5, so as to tilt forward and leave free access to the longitudinal slit 2a of the shell.

[0024] With reference to Figure 1, boot 1 also comprises a manually-operated cuff locking device which straddles shell 2 and cuff 5, in the rear area of boot 1 arranged immediately above the heel, and is structured so as to be able, on choice, to:

- rigidly fix the cuff 5 to shell 2 so as to prevent any relative movement between the two components; or
- completely release the cuff 5 from shell 2 so as to allow the cuff 5 to freely tilt about axis A both forward and backward.

[0025] In the example shown, in particular, the cuff locking device 9 preferably, though not necessarily, comprises: a rigid connection rod or strut 10, which has the lower end 10a hinged to shell 2 more or less at the heel of the boot, so as to be able to freely rotate about a reference axis B which is locally perpendicular to the centreline plane of the boot (i.e. perpendicular to the plane of the sheet of paper in Figure 1), and which extends substantially on the centreline plane of the boot, i.e. orthogonally to axis B, up to reach the portion of cuff 5 which is immediately above the heel of the boot; and a mechanical strut-locking member 11 which is rigidly fixed on cuff 5, immediately above the heel of the boot, so as to be engaged in axially sliding manner by the upper part 10b of strut 10, and is structured so as to be able to selectively prevent any relative movement between the strut 10 and the mechanical strut-locking member 11 so as to rigidly connect the cuff 5 to shell 2.

[0026] The mechanical strut-locking member 11 is a component already widely known and used in the field of alpine ski boots, and hence will not be further described.

[0027] With reference to Figures 1 and 2, unlike to currently-known alpine ski boots, the cuff 5 consists of a rigid front greave 12 and a rigid rear greave 13, which are

adapted to mutually couple to one another so as to form a rigid and detachable tubular body 5, which is provided with a substantially tubular-cylindrical shaped upper annular band or ring 5a which completely surrounds the leg of the user, and with two flat lateral appendages 5b which extend downwards, on opposite sides of the centreline plane of the boot, so as to reach the two connecting hinges 6 arranged on the lateral sides of shell 2.

[0028] The rigid rear greave 13 covers the rear part of the leg of the user, is mechanically constrained to shell 2 by means of the cuff locking device 9, and is hinged directly on the outer and inner lateral sides of shell 2 by means of the two connecting hinges 6, so as to be able to freely rotate about axis A thus remaining on the centreline plane of the boot.

[0029] Hence, the cuff locking device 9 straddles between shell 2 and the rigid rear greave 13, in the area of boot 1 arranged above the heel.

[0030] Instead, the rigid front greave 12 covers the upper part 8b of the protective tongue 8, which in turn covers the front part of the leg of the user, and is hinged on the lateral sides of the rigid rear greave 13 more or less at the two connecting hinges 6, so as to be able to freely rotate about axis A together with, or separately from, the rigid rear greave 13, thus remaining on the centreline plane of the boot.

[0031] In other words, the rigid front greave 12 and the rigid rear greave 13 are hinged to each other more or less at the flat lateral appendages 5b of the rigid tubular and detachable body 5, so as to open as a compass with respect to each other. In this manner, the rigid front greave 12 may, on choice, rotate about axis A in single block with the rigid rear greave 13, and with the limits set by the cuff locking device 9; or tilt/rotate forward in an independent manner from the rigid rear greave 13, so as to open/decompose the two halves of the upper annual ring 5a.

[0032] With reference to Figure 1, cuff 5 is also provided with a manually-operated greaves closing device 14, which is structured so as to be able to selectively maintain the rigid front greave 12 stably and rigidly coupled to the rigid rear greave 13, so as to form/compose the rigid and detachable tubular body 13.

[0033] Preferably, though not necessarily, the rigid front greave 12 is lastly shaped so as to be able to mechanically couple with the upper part 8b of the protective tongue 8, so as to prevent the protective tongue 8 from freely moving underneath the rigid front greave 12, when the rigid front greave 12 is rigidly coupled with the rigid rear greave 10 to form/compose the rigid and detachable tubular body 5.

[0034] With reference to Figures 1 and 2, in the example disclosed, in particular, the rigid rear greave 13 consists of a more or less semi-cylindrical rigid shell 13 made of plastic or composite material, which is shaped so as to cover the rear part of the leg of liner 7, more or less in the area from the calf down to where it joins the Achilles tendon, and is hinged directly on the outer and inner lat-

eral sides of shell 2 by means of the two cuff-articulation hinges 6, so as to be able to freely rotate about axis A while remaining on the centreline plane of the boot. Instead, the rigid front greave 12 consists of a more or less semi-cylindrical rigid shell 12 made of plastic or composite material, which is shaped so as to cover the upper part 8b of protective tongue 8, and is hinged to the lateral sides of the rigid rear greave 13 at the two cuff-articulation hinges 6, so as to be able to freely rotate about axis A together with or separately from the rigid rear greave 10, thus remaining on the centreline plane of the boot.

[0035] With reference to Figure 2, the rigid shell 12 forming the rigid front greave 12 is preferably, though not necessarily, also provided with at least one tooth, ridge, a transversal rib or other coupling protuberance 15 which overhangingly protrudes from the inner concave surface 12a of the shell, and is dimensioned so as to be able to engage/mesh in a corresponding coupling seat or groove 15a realized on the upper portion 8b of the tongue, so as to prevent any movement of the upper portion 8b of the tongue with respect to the rigid front greave 12.

[0036] In the example shown, in particular, the protective tongue 8 is equipped with a number (three in the example shown) of coupling seats or grooves 15a conveniently staggered vertically along the upper portion 8b of the tongue, while the rigid shell 12 is provided with a number (two in the example shown) of transversal coupling ribs 15 which overhangingly protrude from the inner concave surface 12a of rigid shell 12, one above the other, and each of which is dimensioned so as to be able to engage/mesh in any one of the coupling seats or grooves 15a vertically staged along the upper portion 8b of the tongue.

[0037] It is apparent that the coupling protuberance(s) 15 may also be realized on the upper portion 8b of the protective tongue 8, and that the coupling seat(s) or the groove(s) 15a may be realized on the inner concave surface 12a of the rigid shell 12.

[0038] With reference to Figures 1 and 2, the greaves closing device 14 instead preferably, though not necessarily, consists of a manually-operated winch fastening device 14, as the one marketed by American company BOA TECHNOLOGY INC, which has the winch-holder unit 14a rigidly fixed on the outer surface of the rigid front 12 or rear greave 13, and has the two tensioning cables 14b which extend from the winch-holder unit 14a so as to tighten and/or couple with the other rigid greave 12, 13, on opposite sides of the centreline plane of the boot.

[0039] More in detail, the winch-holder unit 14a of the winch fastening device 14 in the example shown is preferably rigidly fixed on the outer surface of the rigid front greave 12, above the upper portion 8b of the protective tongue 8, and the ends of the two tensioning cables 14b are rigidly anchored on the two lateral sides of the rigid rear greave 13, on opposite sides of the centreline plane of the boot.

[0040] Winch fastening device 14 is a component already known in the field of footwear, and was already

shown and described in patent applications US19970917056, WO1998US16314, JP20000507254, US20010956601, US20010099566, US19990337763, JP20010519784, W02000US19440, US19990388756, US20010993296, US20030459843, US20050263253, US20070841872, US20070842009, US20070841997, US20070842013, US20070842005, W02005US39273 and US20040623341P, to which reference is directly made for all further details on the structure and/or operation of the device.

[0041] With reference to Figure 1, lastly, boot 1 is provided with a number of manually-operated mechanical boot-closing devices 16, which are suitably distributed to straddle shell 2 and the protective tongue 8, and are structured so as to be able to selectively rigidly fix the protective tongue 8 on shell 2, and at the same time tighten the shell 2 to stably immobilize the leg of the user inside boot 1.

[0042] In the example shown, in particular, the mechanical closing devices 16 preferably, though not necessarily, consist of a series of lever-operated closing buckles 16 which are arranged above the instep of the foot, straddling the shell 2 and the protective tongue 8, so as to be able to tighten the shell 2 while, at the same time, immobilizing the bottom portion 8a of protective tongue 8 in abutment against the upper part of shell 2. The lever-operated closing buckles 16 are components already widely known in the field of ski boots, and hence will not be further described.

[0043] General operation of sky boot 1 is easy to infer from the above disclosure, and hence does not require further explanations. Rather than to specify that, in addition to controlling the movement of cuff 5 by means of the cuff locking device 9, the user now also has the opportunity of releasing/decoupling the rigid front greave 12 from the rigid rear greave 13, and then of walking while leaving the rigid front greave 12 free to move forward thus going along with the movement of the leg of the user. Thereby, the sky boot 1 resistance to bending is exclusively determined by the protective tongue 8, which remains rigidly fixed to the shell 2 by means of the mechanical closing devices 16.

[0044] The advantages associated to this particular structure of cuff 5 are remarkable.

[0045] In fact, the front part of cuff 5 now corresponds to the middle part of the rigid front greave 12, and hence has a much superior structural rigidity than the one provided by the current C-shaped cuffs made of plastic material. As a result, when the user acts on the cuff locking device 9 to stably rigidly fix the cuff 5 (or better, the rigid rear greave 13) to the shell 2, the upper annular band or ring 5a of cuff 5 is sufficiently rigid to prevent even the smallest forward bending of the tibia.

[0046] Moreover, the particular structure of cuff 5 makes the insertion of the foot into boot 1 much simpler and faster.

[0047] Lastly, it is clear that modifications and variants may be made to the above-described alpine or Telemark

ski boot 1 without departing from the scope of the present invention.

[0048] For example, with reference to Figure 3, the rigid front greave 12 may be hinged to the rigid rear greave 13 by means of two auxiliary connecting hinges 6', which are arranged on the outer and inner lateral sides of the rigid rear greave 13, vertically staggered immediately above the two connecting hinges 6, and are aligned along a reference axis C locally parallel to and separated from axis A.

[0049] Thereby, the rigid front greave 12 may rotate on the body of the rigid rear greave 13 about axis C to open and close as a compass, and may also rotate together with the rigid rear greave 13 about axis A to copy the movement of the bottom part of the leg.

[0050] Moreover, in a second non-shown alternative embodiment, rather than consisting of a rigid shell 8 made of plastic or composite material, the protective tongue 8 may consist of a piece of synthetic fabric of suitable thickness, possibly coupled with an impermeable film, which is fixed on the upper part of shell 2 preferably, though not necessarily, by means of gluing, to cover the longitudinal opening 2s.

[0051] Lastly, in a third non-shown alternative embodiment, the cuff locking device 9 may be structured so as to be able to, on choice:

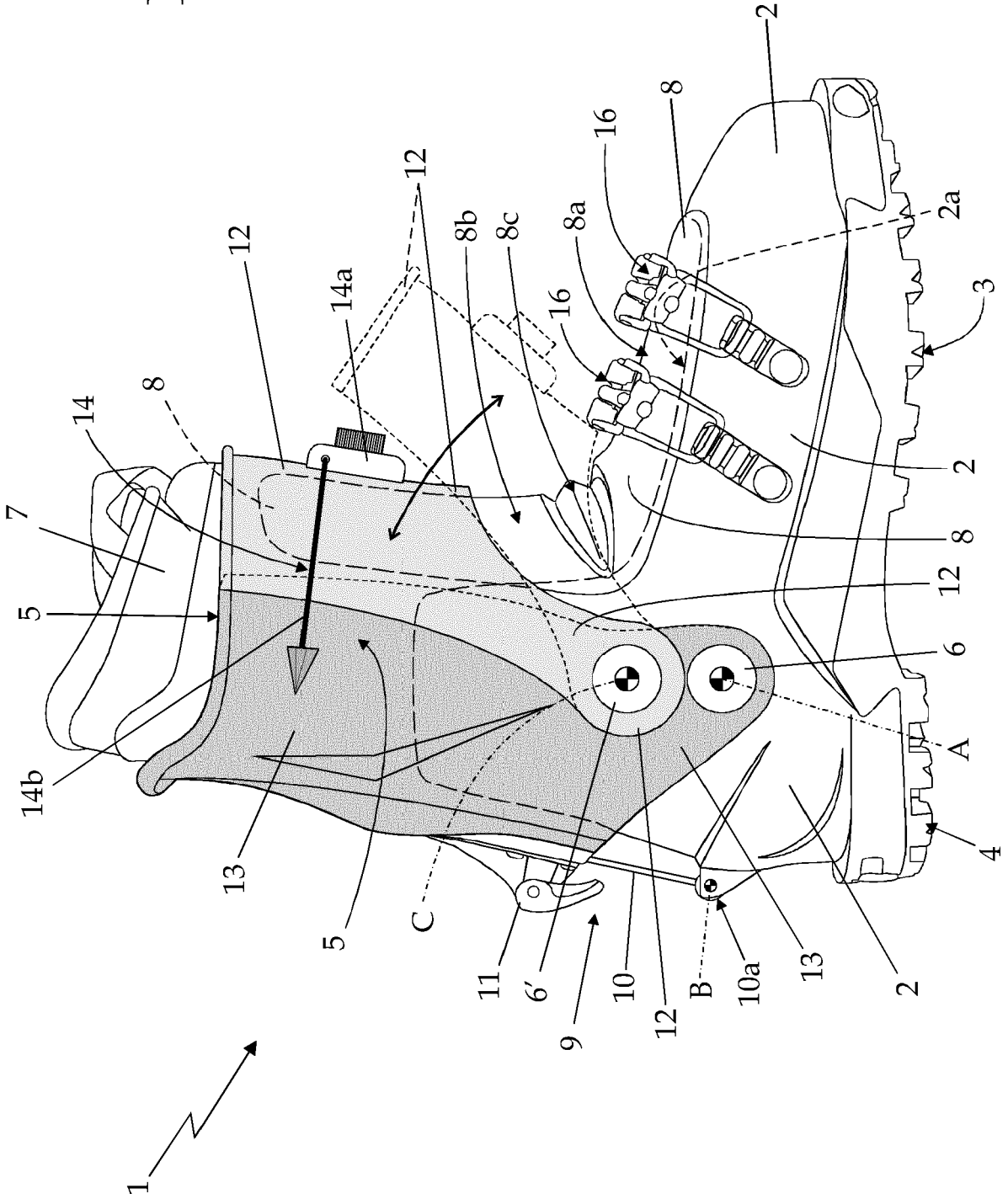
- rigidly fix the cuff 5 to the shell 2 so as to prevent any relative movement between the two components;
- completely release the cuff 5 from shell 2 so as to allow the cuff 5 to tilt freely about axis A both forward and backward; or
- constrain the cuff 5 to the shell 2 so as to only allow positive tilting of cuff 5 about axis A which, starting from a preset resting position, nears the cuff 5 to the tip of shell 2.

40 Claims

1. A ski boot (1) comprising a rigid shell (2) shaped so as to receive the foot of the user, and a rigid cuff (5) which is shaped so as to surround the ankle of the user and is hinged to the shell (2) so as to be able to rotate about a first transversal reference axis (A) substantially coincident with the articulation axis of the ankle of the user; the ski boot (1) being also provided with a cuff locking device (9) which is structured so as to be able, on choice, to rigidly fix the cuff (5) to the shell (2) so to prevent any relative movement between the two components, or to release the cuff (5) from the shell (2) so to allow the cuff (5) to pivot freely about said first reference axis (A); the ski boot (1) being **characterized in that** the cuff (5) comprises a rigid front greave (12) and a rigid rear greave (13) adapted to mutually couple one another so as to form a rigid and detachable tubular body (5); the

- rigid rear greave (13) being hinged to the shell (2) so to be able to freely rotate about the first reference axis (A), and being mechanically constrained to the shell (2) by means of the cuff locking device (9); the rigid front greave (12) being instead hinged to the rigid rear greave (13) so to be able to rotate with respect to the rigid rear greave (13) about a second reference axis (A, C) locally substantially parallel and/or coincident with said first reference axis (A), and to be able to tilt forward in an independent manner from the rigid rear greave (13).
2. Ski boot according to Claim 1, **characterized in that** the cuff (5) is also provided with a greaves closing device (14) structured so to be able to selectively maintain the rigid front greave (12) stably coupled to the rigid rear greave (13), to form/compose said rigid and detachable tubular body (5).
 3. Ski boot according to Claim 1 or 2, **characterized in that** the rigid front greave (12) and the rigid rear greave (13) are adapted to mutually couple one another so to form a rigid and detachable tubular body (5) that is provided with an upper annular band or ring (5a) adapted to surround the user leg, and with two lateral appendages (5b) that extend downward until reaching the lateral sides of the shell (2); the rigid front greave (12) and the rigid rear greave (13) being hinged one another approximately at the lateral appendages (5b) of the rigid and detachable tubular body (5).
 4. Ski boot according to any one of the preceding claims, **characterized in that** the cuff locking device (9) straddles between the shell (2) and the rigid rear greave (13), in the area of the boot (1) located above the heel.
 5. Ski boot according to any one of the preceding claims, **characterized in that** the rigid rear greave (13) is hinged to the outer and inner lateral sides of the shell (2) via two first connecting hinges (6) aligned along said first reference axis (A).
 6. Ski boot according to Claim 5, **characterized in that** the rigid front greave (12) is hinged at the outer and inner lateral sides of the rigid rear greave (13) via two second connecting hinges (6') which are aligned along said second reference axis (C) and are vertically staggered with respect to said first connecting hinges (6).
 7. Ski boot according to any one of the preceding claims, **characterized by** also comprising a protective tongue (8) positioned along the upper part of the shell (2) to cover a longitudinal opening (2a) realized on the upper ridge of the shell (2); and in that the upper part (8b) of said protective tongue (8) extends under the rigid front greave (12).
 8. Ski boot according to Claim 7, **characterized in that** the protective tongue (8) comprises an oblong and convex rigid shell (8) which is substantially L-bent as to copy the profile of the upper part of the shell (2); and **in that** the rigid front greave (12) is shaped so as to be able to mechanically couple with the upper part (8b) of said convex rigid shell (8), for preventing the protective tongue (8) from freely moving underneath the rigid front greave (12) when said rigid front greave (12) is rigidly coupled with the rigid rear greave (13).
 9. Ski boot according to Claim 8, **characterized in that** the upper part (8b) of the rigid shell (8) forming the protective tongue (8) and the rigid front greave (12) are respectively provided with at least one coupling seat or groove (15a) and with at least one coupling knob (15) dimensioned so to be able to engage/mesh in said at least one coupling seat or groove (15a).
 10. Ski boot according to any one of the preceding claims, **characterized by** also comprising one or more manually-operated boot mechanical closing devices (16) which are structured so to be able to selectively tighten the shell (2) to immobilize the user leg stably inside the boot (1).
 11. Ski boot according to any one of Claims 2 to 10, **characterized in that** the greaves closing device (14) is a manually operated winch fastening device (14).
 12. Ski boot according to Claim 11, **characterized in that** said winch fastening device (14) comprises a winch-holder unit (14a) rigidly fixed on the outer surface of the rigid front (12) or rear greave (13), and two tensioning cables (14b) which extend from the winch-holder unit (14a) so to surround and/or couple with the other rigid greave (12, 13) on opposite sides of the centreline plane of the boot.

Fig. 3





EUROPEAN SEARCH REPORT

Application Number
EP 11 19 5968

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Place of search Munich		Date of completion of the search 19 April 2012	Examiner Vesin, Stéphane
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 11 19 5968

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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